GENERAL LIBRARY,
UNIV. OF MICH.
JUN 15 1903

BULLETIN

OF

THE JOHNS HOPKINS HOSPITAL

Entered as Second-Class Matter at the Baltimore, Maryland, Postoffice.

Vol. XIV.—No. 147.] BALTIMORE, JUNE, 1903. [Price, 15 Cents.

CONTENTS.

PAGE

The History of St. Bartholomew's Hospital, London. By THOMAS MCCRAE, M. B., M. R. C. P., (Lond.) 149

Cryoscopy as an Index of Renal Insufficiency in Surgical Diseases of the Kidney. By MARTIN B. TINKER, M. D., ... 162

A Simple Electric Female Cystoscope. By THOMAS S. CULLEN, M. B., ... 166

THE HISTORY OF ST. BARTHOLOMEW'S HOSPITAL, LONDON.*

BY THOMAS MCCRAE, M. B., M. R. C. P. (Lond.),

Associate in Medicine, The Johns Hopkins University, and Resident Physician, The Johns Hopkins Hospital.

At the opening of this hospital in 1889, during the course of his address, President Gilman mentioned the gift of a volume from Dr. Norman Moore, then warden of St. Bartholomew's Hospital in London, with the inscription: "To the library of the newest of Hospitals this account of the progress of medicine in one of the oldest is given by Norman Moore with the earnest hope that the Johns Hopkins Hospital may flourish at least as long as the Royal Hospital of St. Bartholomew in Smithfield, and prove no less useful to mankind—on the opening day of the Johns Hopkins Hospital, 1889." It is the history of this older English hospital that is brought before the Society. One had almost said "the oldest," for it was founded in 1123, but the hospital in Chatham—also dedicated to St. Bartholomew—was founded some years before its namesake in London, probably between 1087 and 1100. In this paper there is nothing new to be presented, but only the gathering together of the records of others.[1]

To the casual visitor to London, and perhaps sometimes also to the medical visitor, St. Bartholomew's is but little known. Not standing directly on the great avenues of travel, few see the buildings except as a result of special search. They are in Smithfield, between Charterhouse and Newgate streets, and perhaps their neighboring buildings, the General Post Office and Christ Church and Hospital, may help to fix the locality. In the original foundation were two establishments, the priory and the hospital. Of the former the church still exists, St. Bartholomew the Great, which, excepting the chapel in the Tower, is the oldest church in London. Within the precincts of the hospital is the church of St. Bartholomew the Less, which is the hospital chapel. The name of St. Bartholomew was given to many hospitals founded in England during the twelfth century. Tradition states that the Apostle Bartholomew went to India, where he suffered martyrdom. Some assert that he was flayed alive and the figures of the Apostle are usually represented holding a knife in his hand. In the eleventh century some of the arm bones of the martyr were brought to England and many miraculous cures were attributed to the relics. From this probably came his choice as a patron saint for so many hospitals.

THE FOUNDER AND THE FOUNDATION.

We have a surprisingly full account of both the life of the founder, Rahere, and the beginning of the hospital. This is contained in a manuscript in the British Museum called *Liber fundacionis ecclesie Sancti Bartholomei Londoniarum.*[2]

*Read before the Johns Hopkins Hospital Historical Society, March 11, 1902.

The writer of this manuscript was an Augustinian canon of the Priory of St. Bartholomew and it was apparently written in the priory. The manuscript is one of the "Cottonian" collection and is numbered "Vespasian B IX." This title was taken from the bust which surmounted the case in which the manuscript was kept. It fortunately escaped injury in a fire in 1771. There are two versions of the work, one in Latin, the other in English. Dr. Moore has carefully studied the evidence as to the date when these were written. The Latin version was probably composed in the reign of Henry II and between the years 1174 and 1189. The date is about forty years after the death of Rahere, the founder, and the writer mentions having talked with those who had known him. The writer himself was a canon under Thomas, the successor of Rahere as head of the priory. To him we owe the account of the foundation and the life of the founder as given in the Latin version. The English version was probably made about the year 1400. A copy of the Latin version was apparently made about the same time and it is this copy which is still preserved.

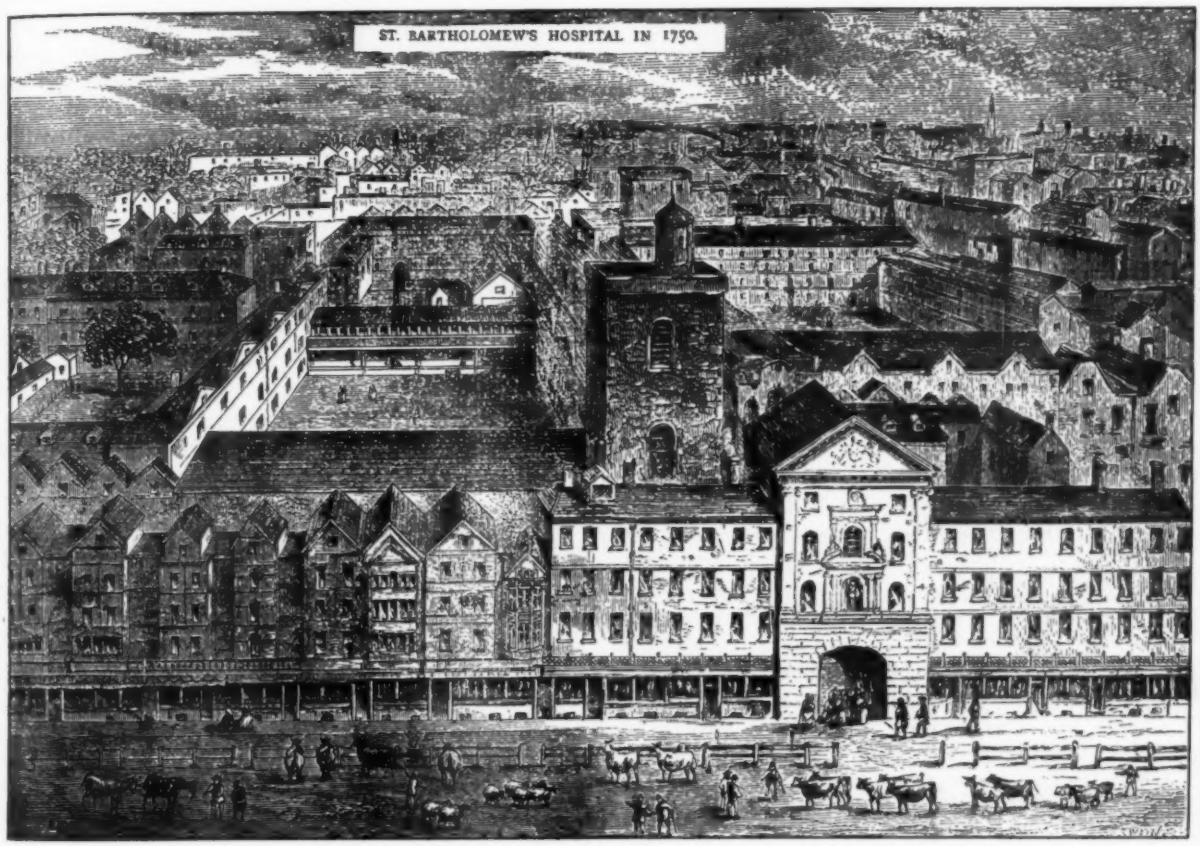
The Book of the Foundation is divided into two parts and each of these is subdivided into chapters. It gives first some account of the life of the founder, whose name is given variously as Rahere, Raherus, Rayhere and Rayer. He is usually spoken of as a jester or minstrel at the court of Henry I. His biographer mentions his origin, saying he was "boryn of lowe lygne," and then comments on his life at court. Here evidently he was a prominent figure in lighter affairs and "lede forth the besynesse of alle the day." In those times this was not incompatible with the occupation of an ecclesiastical office, for Rahere held a stall in St. Paul's Cathedral. In 1120 was the wreck of the White Ship and the loss of the heir to the throne. With this came a great change in the king and court. Whether Rahere wished to be in the fashion or whether he experienced a change of heart we can only guess, but about this time he resolved to mend his ways and lead a more devotional and useful life. To set a seal upon this he determined on a pilgrimage to Rome in the year 1120, "covetynge yn so grete a laboure to do the worthy fruites of penaunce." While in Rome he visited the scenes of the martyrdoms of St. Peter and St. Paul. After this he fell ill, possibly, as has been suggested, with malaria. To Rahere this seemed a judgment for his sins. He considered his end to be near, or as our narrator has said, "and demyd the last oure of oure of his deith drewe him nygh." Then "he schedde out as water his herte in the syght of God and albrake owte in terys, than he avowyd yf helthe God hym wolde grawnte . . . he wolde make and hospitale yn recreation of poure men, and to them so there i gaderid, necessaries mynyster after his power." This passage is noteworthy as showing from the first the intention in Rahere's mind of founding a *hospital*. With the stimulus of sickness upon him it is not strange that he should have thought of the means of relief to others. After this his recovery was rapid and he set out on his return to England to fulfill his vow. About this time he saw a vision, in which he was borne up by a beast and set on a high place from which he beheld a deep pit into which he seemed about to fall. To him who "for drede tremelyd and grate cryes of his moweth proceedyd" appeared the figure of St. Bartholomew. The apostle comforted him and commanded him to found a church in Smithfield in London which would be under his protection and was to bear his name. Rahere doubted the vision at first, but on deliberation determined that he had received a commandment to be obeyed. This account shows us the intention to found first a hospital and second a church, both of which Rahere was enabled to do. It doubtless gives us the opinion then current in the priory as to Rahere's early ideas.

After his return to London he related the story of the vision and set about the fulfilling of his vow. To this end the interest of the King was all-important, and in gaining this he was aided by "Bisshoppe Richarde," who was Richard de Belmeis, Bishop of London. The King listened favorably to Rahere's request. The change in his character after the death of his son may have made him more inclined to good works. Rahere was given a grant of land in Smithfield which was outside the city walls. Here he founded the hospital and church in the year 1123. The location promised little, for the scribe states, "it pretended noone hope of goodnesse." A portion of it was a marsh and the higher part was the scene of hangings and of tortures given to criminals. It is termed "a Golgotha, the place of open abhominacion." In view of the difficulties such as these one sees little basis for the accusations of insincerity sometimes made against Rahere. It has always to be kept in mind that there were two parts to the foundation, the priory and the hospital. The purpose of the latter is given as "for poor diseased persons till they got well, for women with child until delivered, and for the maintenance of the children born there until the age of seven, if their mothers die in the hospital."

The date of the foundation is given and the names of the prelates of the day which serve to fix the time beyond doubt. The chronicle says, "The chirche he made of ceemly stonewerke tabylwyse and was an hospital howse a litile longer of." At this time Rahere was the victom of envy and malice; plots even were made against his life. He apparently applied to the King for protection and a charter was given which secured for the foundation the rights of the crown.[2] The date of this is 1133 and both the church and the hospital are specified. Copies of it made in the reign of Henry VI are still extant and at that time, Dr. Moore states, the original was produced in a court of law.

The Book of the Foundation then gives the accounts of many cures wrought at the shrine. Nearly all of these are ascribed to miraculous healing and the influence of the saint. They were apparently done at the church. Yet there were evidently patients in the hospital, as there is a reference to one whose duty it was "to seke and provyde necessaries to the nede of the poer men, that lay in the hospitall." The expression "poor" might suggest that it was more of an almshouse than a hospital, but this mode of reference to the patients is very common and in the seventeenth century

was frequently used. The first case in which specific mention is made of admission to the hospital may be quoted at some length. It may be said to be the first case record of the hospital. Many of the cases since then have not been described as fully as this one of the twelfth century. The account is given in Capitulum XXVIII of the first book. The history in part is as follows: "An nothir man Alfunyne by name in the towne of Dunwych, that dwellid on the see syde, so was contracte that he myghte not use the free office, nethir of hande, ne of fote, his legges were clevynge



to the hynde parte of his thyes, that he myghte nat goo, and his handis turnyd bakewarde, no thynge with them myght he do, ne worke: the extremyteis of his fyngers were so rigorisly contracte in the sinowys, that he myght unneith put mete to his moweth. In this grevous sykenes he passid his yonge age. . . . Therefore for that he was ferre from that chirche he yave shipmen for hyr hyyr and by shippe he was browght to the chirche, and put in the hospitall of pore men. . . . And he began yn the meyn while, by the vertu of the apostle to take breith into hym and he desired helth by certeyn incrementys began to come ageyn: ffirst with handys thow they were crokyd, he dyd make smal workys as disstafes . . . and furthermore by succession, whan othir membrys used thyr naturall myghte he followid yn greater workys, hewyrrys of wode with axe and squarerys of tymbyr with chippynge axe and nat longe aftir the crafte of carpentyre. . . ." From which we may judge that his restoration to health was complete. To make a positive diagnosis now would be difficult; his condition may have followed an acute illness or it may have been due to a neurosis. In any case the removal to new surroundings with confidence in the outcome had great influence on the result.

The second portion of the book opens with a prologue in which Rahere's death in 1144 is mentioned. The scribe says, "the cley howse of thys worlde he forsoke and the howse everlastynge he enterr'd." At his death Rahere commended his little flock, "with little land and right few rents" to the care of St. Bartholomew. The name of his successor is given "Thomas oone of the chanonns of the church of Seynt Osyth," of whom, after his long term of office of thirty years, it is said, "he decessid and was put to his fadres." Then follows the account of many miracles done by the influence of the saint. Many of these are of miraculous healing and resemble the case quoted before. They are generally characterized by paralysis, wasting and contractures. Some are evidently cases of hysteria thought to be instances of de-

moniacal possession. In only one instance is mention made of a stay in the hospital.

The church of the priory (St. Bartholomew the Great) has existed until the present day, although only parts of the original are still preserved. The site of the priory is now covered by houses. The adjoining district of Smithfield, as noted by the scribe, was the scene of executions before Tyburn. Here William Wallace was beheaded in 1305. Wat Tyler was probably slain near the hospital in 1381. During the religious persecutions of the reign of Mary many were burned at the stake. Neighboring ground is also said to have been used for tournaments and doubtless the proximity of the hospital was convenient for the dressing of the wounds. Here, too, the great Bartholomew Fair was held. This was probably first held before 1133, for in the charter granted by Henry I in that year, reference is made to the custom of holding the fair. This charter also gave immunity to arrest for three days to all those who were attending the fair. At one time it was the great cloth fair of the kingdom, although goods of all kinds were sold. In 1691 it was shortened from fourteen to four days. At first held altogether for business, it gradually acquired more and more features which served only for amusement. These degenerated and ultimately the fair was regarded as a time of great license. In 1844 the fair was removed to Islington and in 1855 came to an end.

The Hospital.

From 1123 until the present the hospital has stood on the same spot and with the exception of a short period in the reign of Henry VIII its doors have always been open. So far as the records which are available show we have little information regarding the hospital in its earlier days additional to that contained in the account of its foundation. The original hospital had eight brethren and four sisters; they elected a head who was called the master. He and the brethren had to swear obedience to the prior of St. Bartholomew's Church and were required to render an account of their income and expenditure to him. The enclosure at first probably contained the hospital buildings proper, but gradually others were added. Chapels with lodgings for the chaplains and other buildings were collected about. Later some of these houses were rented to outsiders. At one time the medical attendants occupied houses in the hospital grounds. This custom exists in some of the London hospitals to-day, quite apart from the usual resident staff.

As already stated, Henry II confirmed the rights of the hospital by a charter in 1133. King John about 1204 also issued regulations regarding the hospital and priory. In these the hospital is made subject to the rule of the priory. It is stated that the deed endowing the hospital is not recorded, so that the nature of the endowment is not known. In 1223 and 1224 we have the record of a gift from Henry III to the hospital:

"The King to Engelard de Cigoyny greeting. We command you to give to the patients of the Hospital of St. Bartholomew in London as our gift, one old oak in our forest of Windsor on the Thames, with the least possible injury to our forest and the greatest use to the aforesaid patients for their hearth."

Various citizens of London seem to have aided the hospital, among whom was Henry Fitz Elwin, the first mayor. In 1226 the Earl of Salisbury, one of the witnesses of the Magna Charta, left a donation in his will. In 1230 some of the hospital lands in Essex were exempted from taxation. There are records of many additions to the endowment in the succeeding years. Thus in the reign of Edward II there is a grant of "thirty seven acres of land in St. Giles and St. Botolph without Aldgate in aid of the support of the poor and infirm in the said hospital." Of the endowment about the middle of the fifteenth century we have full records. These are the work of John Cok, who was a brother of the hospital. He was the renter of the hospital and in the years after 1456 he wrote full accounts of the property, which are still preserved. In the reign of Henry II (1422-1461) Parliament allowed the priory to depute to the master of the hospital the carrying out of repairs to the water supply from their aqueduct in Iseldon. One-half of the water, which was conveyed in pipes, was to be given to the hospital, for which a rental of 6s. 8d. was to be paid. By the time of Henry VIII the rents of the hospital from the endowment are stated to have amounted to about 370 pounds sterling, from which various payments amounting to 66 pounds had to be deducted. During this period but little change apparently occurred. The endowment gradually increased, which one might wish were more common at the present day. There had been other similar institutions founded, St. Thomas Hospital in 1213 and Christ's Hospital soon after. Bethlem, which was "an hospital for distracted people," was founded in 1247.

There is little to note about this period until in the reign of Henry VIII, when, along with other religious foundations, the Act of Dissolution in 1536 closed the doors. So far as found there is no definite record of the process, whether the patients were all turned out of doors at once or the hospital gradually emptied by the stopping of further admissions. From the general drastic character of the proceedings at that time, we may suppose that no great consideration was shown. The Priory was bought by the Attorney-General, but there is no record of any sale of the hospital or its endowment. It remained in the possession of the Crown. The hospital may have been plundered, however, for the library disappeared either now or shortly after, and in a petition from the citizens of London a short time later mention was made of the fact that nearly all the furniture had been carried away. One can hardly imagine what the closing of the hospitals must have meant. To-day it would be a calamity; then it was certainly no less. The condition of affairs became intolerable and it was not long before steps were taken to remedy the existing conditions. This action was taken by the civic government. So in 1538—two years after the closing of the hospitals—we find the mayor, aldermen and citizens

petitioning Henry VIII that he would grant to the mayor and his brethren or to such other as should stand most in his gracious favor, the rule of the three "hospytalls or spytells called Saint Mary Spytell, Saynt Bartylmewes Spytell and Saynt Thomas Spytell," for the relief of the poor and needy. But they evidently had in mind the practical administration of the hospitals if the request was granted, for they were careful to ask for the rents and revenues as well. In the petition to the King the evils of the lack of hospitals are pointed out and they refer to "the myserable people lyeing in the streete offendyng every clene person passyng by the way w^t^ theyre fylthye and nastye savors." Then, too, they say that many of these sick have resorted to the parish churches. The explanation of this complaint is of interest. The larger churches had a portion of the building set apart for the sick—probably especially for the lepers—so that they might not come in contact with the general congregation. These special places can still be seen in many of the old churches. But with this provision in the larger churches in London, the smaller parish churches had neglected such arrangements for the sick, and so when the larger ones were closed, the sick folk went to the parish churches where they mixed with the congregation to the no small danger of infection. Consequently the citizens prayed that the churches might be reopened as well as the hospitals—a plea for both the spiritual and bodily welfare of the community.

Too often do such petitions fall upon deaf ears and this was no exception. Apparently the King took no notice of the citizens' request. Subsequently, however, whether they succeeded because of their importunity or whether the conditions became intolerable, we find the petition granted in 1644 and letters patent issued re-establishing the hospital. This was eight years after the Act of Dissolution. The King restored the site of the hospital, with the rights and privileges as they had been vested in John Brereton, the last master. The greater part of the endowment, however, was not restored. The document reads that "we determine to create erect found and establish a certain hospital," and this may have given rise to the statement sometimes made that St. Bartholomew's Hospital was established by Henry VIII. The regulations for the new establishment were modelled on those of the old. There was to be a master and four chaplains, all of whom were to be "priests." The fourth chaplain was to be the visitor to the prisoners in Newgate. The appointments were undoubtedly given as rewards, and, as Dr. Moore points out, were probably made to yield as much as possible. The new officers may have sold the library. They may also have profited by the fact that there was freedom from arrest within the hospital. This had been granted by Edward II. It is worthy of note that this was tested in 1541, at the time when the hospital, as such, was closed. In that year an arrest was made in the hospital. A protest was made to the mayor and we find that the arrest was "dyscharged."

The citizens had petitioned for the restoration of the endowment many years before and they doubtless saw that to have a hospital without any funds was not a complete solution of their difficulties. We may suppose that they in no way neglected to improve this state of affairs, for in 1546 the King gave a yearly grant of 500 marks derived from certain property, in consideration of the citizens contributing an equal amount. (The mark was equivalent to 13 shillings.) This was quite inadequate and doubtless there were representations to this effect, for in 1547 we find that nearly all the former endowment was restored. In the same year a tax for the maintenance of the hospital was ordered by the city. The site of the hospital was made a parish. An attempt was made to give the hospital a new name and it is referred to as "the House of the poor in West Smithfield, near London, of the foundation of Henry VIII." This was not generally adopted and the hospital continued to be known by its former name. In return for these grants from the Crown, the mayor and citizens bound themselves to provide for one hundred poor men and women in St. Bartholomew's Hospital. The regulations also state specifically the full hospital staff. This was to consist of thirty-two people, among whom there were only one physician and one surgeon. There were to be eight beadles whose duty it was to bring the sick to the hospital and also chastise all vagabonds and beggars whom they might find. The nursing staff was to consist of a matron and twelve assistants. In 1548 and 1549 a new system of government of the hospital was introduced. The Council ordered that four aldermen and eight commoners were to be the governors. They were to be elected by the mayor and aldermen, half to be appointed every year and to serve for two years. When one reflects, it seems an unusual thing to see an institution which in 1536 was a religious foundation, managed no one knows how, under the direct control of the city government in 1548. There can be no reason to doubt that the change brought increased usefulness to the hospital. As time went on, the new governing body appointed others to be governors, chiefly from among those who had been benefactors and friends of the hospital. These became more numerous until in time the municipal corporation ceased to take a leading part in the management. This gradual change will be described later.

From this time on we have careful records of the hospital affairs. The expenses of administration at that time may be noted. For 1552 it was estimated that the fixed expenses would amount to 798 pounds and for uncertain items, which in 1551 had amounted to 60 pounds, probably 100 pounds would have to be allowed. In 1553 the hospital published a most interesting document called "Orders and Ordinances for the better government of the Hospital of Bartholomew the lesse." This is a statement to the public of the condition of the hospital affairs and of the methods of management and administration. As an example of the internal economy of a hospital of that time it is well worth reading. The "orders" begin with a preface to the reader in which the recent history of the hospital is reviewed. The writer begins with some generalities. "The wickedness of report at this day, Good Reader, is grown to such ranckness that nothing almost is able to defend it selfe against the venime thereof." He then recounts the steps taken to re-establish the hospital

and mentions the yearly allowance of 500 marks from the King, which was gladly received by the citizens, "Thinking it for their parts rather too little than enough." But on investigation they found the raising of the King's donation "to lye onely in a certain of houses, some in great decay and some rotten ruinous." Then in the hospital itself they found only "so much of household implements and stuffe toward the succouring of this hundred poor (which the city agreed to provide for) as sufficed for three or four patients." However, the citizens raised not only their 500 marks but in addition over 1000 pounds, which enabled them to provide for nearly one hundred sick. Good intentions are too often misunderstood and so we hear that "certain busie bodies more ready to espy occasion how to blame other, than skilfule how to redress things blameworthy, indeed, yea, I fear me having all their zeal in their tongue onely," have slandered the good citizens and poisoned the minds of the preachers against them. These preachers wrongly made public the backbiters' slanders and the citizens for their work received "an open detraction." Yet in the five years since the hospital was reopened "there have been healed of the Pocks, Fistulaes, filthy Blains and Sores to the number of eight hundred and thence safe delivered that others having need might enter in their room. Beside eight score and twelve, that have there forsaken this life, which else might have dyed and stunck in the eyes and noses of the City." Instead of praise slander has come, yet the citizens have been silent, looking for their reward in heaven. Such results speak for the good administration of the hospital; the slanderers ought to repent, but as they may not, the Lord Mayor now publishes the orders for the hospital both to stop the slander and let all men know how the hospital is administered. If further reform is needed the governors will gladly adopt it.

The regulations open with a list of the officers and a recital of the duties of the governors. The installation of newly elected members was an impressive ceremony. To them a solemn charge was delivered, from which one part may be quoted. "For truly ye cannot be blameless before God, if after ye have set hand to this good plough and promised your diligence to the poor, ye shall contrarywise turn your head backward." Then the new members were duly received into fellowship, after which all dined together, "every man at his own cost and charge." The duties of the various officers are then set forth. From the governors four surveyors were appointed who had the oversight of the property, leases, rents, etc., and four almoners who were a sort of house committee with discretion over the internal affairs of the hospital. There were two scrutiners who audited the accounts and are charged as follows: "Ye shall be ready and diligent to make search and enquiry from time to time for all such Gifts, Legacies and bequests, as have been or shall be given or bequeathed to the succor and comfort of the poor of this house." This is good evidence of the laudable intention to allow no chance of revenue to be overlooked, especially as they were exhorted "to commend and set forth the good order of this house" when they chanced to meet "good, vertuous and wealthy men." None of the governors received any salary; their reward was to be that promised to all who help the poor. Then follow the duties of various other officials. These are given in minute detail. The Hospitaler, who seems to have been a sort of steward, among other duties was to see that every person applying for admission was to be seen by two of the chirurgians who decided if his disease was curable. They were specially enjoined not to admit any incurable cases and while attending to the physical infirmities they were also to exhort the patients regarding their spiritual welfare. The matron was to have charge of the sisters, who apparently were only in the wards during the day except in case of "the present danger of death or needfull succour of some poor person." That idleness might be avoided they were to be set at "spinning or some other manner of work." The sisters were to be in by seven o'clock in winter and nine o'clock in summer, and they are commanded that "so much as in you shall lye, ye shall avoid and shun the conversation and company of all men." The porter's duties were onerous. He kept the gate and was to deny admission to suspicious persons. He was to go through the wards in the evening, "see them in good order and cause them to say the appointed Prayers." To such as offended by swearing, abuse of the officials, or by refusing to go to bed at the appointed hour, "him shall ye punish (after once warning given) in the stocks" and later report to the almoners. The beadles were to patrol certain districts searching for the sick or diseased, keeping careful watch that no former patients were counterfeiting disease or begging and "if ye shall fortune to find any so doing, ye shall commit him or them to some Cage." The list of duties of nearly all the officers ends with this exhortation, "if ye perceive at any time anything done by any officer of this house or other person that shall maintain disorder or procure slander to this house, that ye then declare the same to some one or two of the governors of this house, and to none other person and *no further meddle therein.*" Lastly is a list of the various salaries and the form of "passport" given to the patients on discharge. These regulations are very definite; each man's duty was clearly set forth. One is impressed by the careful directions given for the keeping of the accounts and records. These are very thorough. One can only regret that equal care was not taken with the medical records. These orders probably served as a model for the regulations issued in 1557 for the four royal hospitals, St. Bartholomew's, Christ's, Bridewell and St. Thomas.

In 1644 we find a record of what may be called concerted action in dealing with the sick and vicious poor. They were all to be examined at Bridewell, the sick who were curable were to be sent to St. Bartholomew and St. Thomas Hospitals, the small children to Christ's Hospital and the "stout and sturdy rogues and vagabonds" were to be employed in Bridewell.

In the great fire of 1666 the hospital buildings escaped injury, but much of the hospital property was destroyed and the income reduced for some time.

The gradual evolution of the government of the hospital

was not brought about without some conflict of authority. Originally the control of the hospitals was directly in the hands of the city authorities. Gradually, however, the boards became more independent until at last they practically controlled the hospital administration. This, however, was finally noticed by the city and in 1697 a warning was sent to the hospital clerks that they had been remiss in not summoning the aldermen to their meetings, for "every alderman is a governor of every of the hospitals of this city." In 1709 the hospital petitioned for the payment of long arrears of the 500 marks per annum which Henry VIII had given. The court of chancery finally granted this. For some time after this matters seem to have gone on quietly, but in 1755 the city council again investigated their relationship to the hospitals and appointed a committee to enquire into what rights the mayor and citizens had in the hospitals and whether such rights had been given up or taken away. Either the committee was very deliberate or the matter was much involved, for their report was not made until 1766, in which it was stated that the mayor and citizens had the sole power of governing these hospitals and that while innovations had crept in they did not affect this right. The authority of the governors was only derived from the civic government. Evidently after this there was much friction between the city authorities and the governors of the hospitals. The city obtained control of the financial matters as far as possible. In 1778 is a regulation that the box containing the hospital seal should have three locks, one key to be kept by the lord mayor, one by an alderman and one by a member of the council. The court of aldermen also resolved that "all business appertaining to the city and hospital seals" should be transacted by the common council. The result of this was soon seen, for in 1779 the clerks of the hospitals came with certain leases to be sealed, but this was refused and the matter referred to a committee. In the same year the clerks were ordered to submit their accounts to the common council. In 1780 and 1781 the council appointed incumbents to various livings which had before been in the gift of the hospitals. Thus to the vicarage of Little Wakering in Essex the governors of St. Bartholomew's Hospital appointed the Rev. Mr. Mossop, but the city council had given it to the Rev. Wm. Owen and sealed his presentation with the seal of the city. The frequent story of a conflict of authority can be read between the lines. The hospital had governed its own affairs for many years without any reference to the civic authorities, who awoke to the fact and enforced their rights, a proceeding doubtless resented by the governors. Such a conflict could not go on, and so in 1782 steps were taken to bring about an understanding. A committee was formed from both of the bodies concerned and they drew up an agreement which was adopted by Parliament in the same year. We find in connection with this that the thanks of the city council were given to "Mr. Alderman Crosby for his endeavor to bring about a reconciliation between the city and the acting governors of the royal hospitals." The act of 1782 provided for a certain number of governors to be appointed by the city, the others to be elected by the board itself from among the friends and benefactors of the hospital. This practically has been the constitution of the board of governors up to the present. This gradual evolution of the management of the hospital from the time of Henry VIII until near the close of the eighteenth century is of interest. It took time, some misunderstanding and friction before a final adjustment to best meet the needs of the hospital was reached.

The buildings have always stood upon the same site. For a long time there was a public thoroughfare through the hospital grounds. There was much trouble caused by people selling various articles and crowding the street. There were various orders issued for the regulation of this. The early part of the eighteenth century saw many of the London hospitals founded, such as Westminster, Guy's, St. George's, London, etc. At this time St. Bartholomew's was in a curious condition. There were many buildings, some of the wards opened directly on the thoroughfares and communication between the different parts was difficult. There were also private individuals living within the hospital grounds. These at times gave trouble, one having to be arrested for coming home late at night and assaulting the porter. In 1729 a complete alteration in the buildings and general plan was determined upon and this was carried out from 1730 until 1769. The present quadrangle was then laid out. It consists of four large blocks, each four stories high. The staircase leading to the great hall was decorated by Hogarth.

The number of beds in 1547 was probably 100. In 1644 from the record of the patients they are estimated as about 250 and in 1682 there were probably 300 beds divided among fifteen wards. To-day there are 741 beds. Out-patients were probably treated from early times, but their number was not large until comparatively recently. In 1682 the number is stated not to have exceeded 300 a year. Sir William Church states that the question of their treatment at that date was in dispute between the medical staff and the governors. He quotes a saying regarding the women out-patients of those days, who are said to be "by far the most numerous, troublesome and tedious in their examinations and making their complaints, there the Physician is or ought to be attended with a Beadle to keep good order and call aloud the names of the patients."

The time of the beginning of medical teaching is difficult to state. In the works of John Mirfield, who wrote a treatise on medicine about 1380, entitled "Breviarium Bartholomei," there is a reference to "magister meus," by whom he had evidently been taught. Dr. Moore states that the earliest student of whom there is a record was Brother John Helme, who lived in the reign of Edward III. According to the calendar students began to attend in 1660, but there was undoubtedly instruction given before this. Regulations regarding the students were issued in 1662. The library was re-established in 1667, it is stated, the earlier library having disappeared at the time of Henry VIII. The first record of a room set apart for a museum is in 1726, but a beginning had been made before this, for in 1714 there is an order that the stones removed by lithotomy should be hung up in the "Compting House"

according to ancient custom. In 1654 an order had been passed that the operation of lithotomy should be done in public. Edward Nourse was the first man to give regular courses of instruction. These were in anatomy and surgery. There is a syllabus of his lectures published in 1729. In 1750 the physicians and surgeons made application for leave to do autopsies and for this permission was granted, "the committee being of opinion that the practice might conduce greatly to the benefit of the public in general, also to the poor patients hereafter to be admitted." In 1767 the first theatre was opened and permission given to the staff to use it for operations and also for the purpose of giving lectures to the students. The school buildings were enlarged in 1791 when the fame of Abernethy had greatly increased the number of students in attendance.

Lock Hospitals.—These were adjunct establishments which had formerly been used as hospitals for lepers. When leprosy became rare in England they were put to other uses. Two became the property of St. Bartholomew's and were used principally for luetic patients. The one in Southwark, known as the *Lock*, was for male patients and the other at Kingsland, termed the *Spital*, was for females. Each contained about 30 beds and had regular attendants. In 1754 the attending surgeon, who was also known as the guide or guyder, had a house and a salary of 30 pounds a year. At this time Sir James Paget estimated that the locks cost about 700 pounds a year. The hospital funds not being able to support them, they were abolished in 1760 and wards were set apart in the hospital for the cases previously sent to the locks.

The Apothecary and the Hospital Pharmacopeia.—The history of these have been fully dealt with by Sir William Church[5] in an article not only of interest in relation to St. Bartholomew's but also in connection with the history of the use of drugs and the development of the hospital pharmacy. Since the restoration of the hospital in 1544 there is a good account preserved of the practice in regard to drugs and treatment. At that date the surgeons apparently supplied their own drugs and dressings (which certainly would hinder undue extravagance), but at times they were allowed extra remuneration for these or for special attention to certain cases. Some of these notes are curious, thus:

"Paid for helinge Henry Smythe's hedde which a sturdy beggar did brake, x^{s}."

And in 1550 this item appears:

"Paide for a great kettle for the surgeons to boyle with xxv^{s} x^{d}."

About 1570 the word "poticary" or "potticarye" appears in the records. Soon the question arose as to how much of the supplies he was to provide and in 1586 the decision was given that the apothecary was to supply the medicines administered "inwardely and not otherwise," while the surgeons were to supply "all other stuffe." In 1614 the apothecary was given rooms in the hospital. The expenses for drugs, etc., at that time amounted to about 105 pounds a year. In 1676 this had increased to nearly 400 pounds. Much of the early knowledge of the preparations used is obtained from the papers of Dr. Edward Browne, who was the eldest son of Sir Thomas Browne. These are dated 1670. In 1739 the first dispensatory of St. Bartholomew's was published and after it numerous other editions. There are many complaints as to the cost of drugs, not peculiar to this hospital nor to that time. Many attempts were made to cut down the expense. Thus in 1823 the treasurer wrote about the increased expenditure which was bad enough in regard to dressings but "in the article of leeches the evil is of still greater magnitude." The number used was 1000 a week, "and it does not appear that this increase is in any way to be attributed to a change in the practice of bleeding for *the cupper's bill* for the last quarter has also very considerably increased in amount." The fees for cupping in 1823 amounted to 46 pounds.

The hospital has prospered and is well endowed. Very recently additional ground has been obtained from the adjacent foundation of Christ's Hospital. Its modern history requires no mention.

Some writers have sneered at Rahere and called him insincere and a hypocrite. He may have been, but there seems no reason to suppose it from any written accounts, while his works speak otherwise. The evidence of 780 years is all on his side and against his detractors. We wish St. Bartholomew's Hospital continued progress and return in kind Dr. Moore's good wishes.

The Physicians and Surgeons.

It is, after all, in the lives and deeds of these that much of the history of a hospital is written, and St. Bartholomew's has reason to be proud of the record. Prior to the restoration there are few names to consider. There is one man of whom we should speak. This is John Mirfield, who was a canon of St. Bartholomew's Priory. He is thought to have passed from the hospital to the priory, as was not uncommon. He was a contemporary of Chaucer and the medical practice of his day was probably much like that of John of Gaddesden, who is thought to have been the original of Chaucer's physician. The writings of Mirfield are the earliest productions of the hospital. The work is termed "Breviarium Bartholomei,"[6] and was written about 1380. Several manuscript copies exist, the handsomest of which Dr. Moore states is in the library of Pembroke College, Oxford. The book opens with a dedication, the essentials of which may be quoted from Dr. Moore's description: "Memory is slippery; this makes it wise to collect what is known of medicine into a summary. Another reason for the book is that there are so many false physicians about who commit frauds upon the public." He has some complaint to make about patients in general, "multi infirmi modernis temporibus valde impacientes sunt." Then, too, he says, "vero nisi statim in prima die senciant alleviare de medico diffidunt ejusque medicinas respuunt et contempnunt." All of which suggests that human nature was much then as now. The work is largely a compilation and he uses all the authors mentioned by Chaucer. Cases are referred to but no conclusions drawn from them and, as Dr. Moore notes, he

makes no mention of the Black Death which was prevalent in his time. Much of his treatment is ridiculous, but some things are as good to-day as then. He notes the use of sulphur water as a cure for scabies. Chronic rheumatism was treated by rubbing the part with olive oil, which was to be done while prayers were recited seven times, a means of making certain that some time would be spent in the treatment. He observed that an injury on the right side of the head might lead to paralysis on the left side, and relates an instance in one of their canons. The work is a curious mixture of medicine and medieval superstition. Mirfield repeated the opinions of older writers and drew few conclusions from facts observed by himself. One of the earliest records of the word "smalpockes" is in his writings.

For some time after Mirfield there seem no records of any note. An important factor in English medicine to be kept in mind in relation to St. Bartholomew's was the founding of the College of Physicians in 1518. This marked a new era in English medicine. Among the men of this day Dr. John Caius (1510-1573) must be mentioned. He was associated with the University of Cambridge—to a college of which his name is given—and with the College of Physicians. He occupied a house within the precincts of St. Bartholomew's but was not a physician of the hospital. The first banquet of the College of Physicians is said to have been held in his house in 1554. Caius wrote a treatise on the sweating sickness of some interest. He is to be remembered, too, as one who left a bequest to encourage the study of anatomy by which Harvey was probably aided in carrying on his work.

After the re-establishment of the hospital by Henry VIII, we have a complete record of the men associated with it. In following the conditions of practice and the relationships of the physicians and surgeons to each other, we probably see those which existed in England at these times. There was a great distinction made between the physicians and surgeons. The former regarded themselves and were generally regarded as being much superior to the latter. Surgeons were forbidden by law to prescribe physic and the College of Physicians frequently prosecuted and had punished those who infringed in this regard. Thus in St. Bartholomew's the surgeons had the actual charge of the patients in the wards, but they were controlled by the physicians, and even in 1754 we find the renewal of an order which prohibited the surgeons from prescribing any internal medicine except "mercurial physick or purges." The physicians at first were resident in the hospital grounds, but their duties were limited to prescribing for patients who were brought to them. This was done once a week in the large hall. It was no part of their duty to visit patients in the wards, but the surgeons were directed to bring their patients to the physicians. Perhaps the best idea of the relative positions of physician and surgeon can be got from the orders drawn up by Harvey in 1663 (note 7). This system was gradually changed; the physicians at first had only out-patients and the in-patients were brought to them once a week; later they were required to go round the wards once a week and see all the patients who were under the care of the surgeons. Some time after they began to admit patients themselves and in 1749 is an order that the physicians must visit the patients in the wards. It was some years after this that the surgeons were given complete charge of their patients.

There were special departments as well. Thus for some time there was a lithotomist who also frequently operated for hernia. This, as a separate position, continued until 1730, when it was merged with that of surgeon. The operation of lithotomy was held in great repute, for the lithotomists were paid a liberal salary and were given extra dressings, while there were extra charges for the diet and maintenance of their patients. The appointments as surgeons to the lock hospitals were also separate and were often given to the senior assistant surgeon to the hospital. They were abolished in 1760. A Bone-Setter was appointed in 1596. The first incumbent was John Isard, who was paid 8 pounds a year. He had one successor, after whose death the duties were performed by the surgeons. For some time there was also a curer of scald-heads. In 1621 Francis Holcombe was appointed. She was to receive twenty shillings for each cure. The disease must have been very prevalent and she very successful, for in 1635 she received 125 pounds, much more than the salary of any of the physicians. "Whether the disease or the remedy were exhausted does not appear," as Sir James Paget remarked, but the payments grew less and the last is mentioned in 1697.

The Physicians.—The charter of 1547 stated that there was to be one physician and one surgeon appointed to the hospital. But actually there were three surgeons in office and no note is found of any physician until 1567. It is quite possible that the duties of a physician were discharged by Thomas Vicary, who lived in the hospital and held a position apparently much like that of a medical superintendent. His position was like that of the master of the old days, but he was responsible to the board of governors and not to the priory. He was over all the officers of the hospital. Vicary was a prominent man and was sergeant-surgeon to Henry VIII, Edward VI, Mary and Elizabeth. He had been made in 1541 the first master of the amalgamated companies of Barbers and Surgeons. He is also the author of the first treatise on anatomy written in English. This is called "The Englishman's Treasure, with the true Anatomie of Man's Body," and was published in 1548 and reprinted by the surgeons of St. Bartholomew's Hospital in 1577. It was largely compiled and contains but little original matter. The first regular physician was Dr. Lopus or Lopez. The date of his appointment is uncertain, but it was between 1561 and 1567. It is fortunate that his successors have not followed in his steps, for Lopus came to no good end. His connection with the hospital had not been satisfactory, he had been reprimanded, and ceased to be a physician to the hospital in 1580. He was concerned in a conspiracy against the life of Queen Elizabeth and was hanged in 1594. For some time there was only one physician, and we find in 1633 the board saying, "there is noe need of two." In the latter part of the seventeenth century a second was appointed, in 1750 three, in 1854 four and at present five. The physicians lived in the hospital grounds

for some time. Later they were given a sum of money in place of a house.

Among the early physicians was Dr. Timothy Bright (not he of the kidney, who was at Guy's), remembered especially as the modern inventor of shorthand. This he brought out in a work entitled "Characterie," dedicated to Queen Elizabeth. He was appointed in 1586, but only held office until 1590, when, Sir James Paget states, he was dismissed for neglect of duty. Elsewhere he is said to have resigned. Be that as it may, he gave up medicine, took holy orders and was given a living in Yorkshire. He wrote several medical works as well as on metaphysics and natural science. One of his works was "A Treatise on Melancholy," in which he deals with "the Physicke-cure thereof and spirituall consolation for such as have thereto adjoyned afflicted consciences." Sir James Paget considers his theology to have been probably better than his physic.

Among the physicians one name stands out, that of Harvey. He was appointed physician to St. Bartholomew's in 1609 and probably held it until 1643. The records of his association with the hospital were published by Sir James Paget in 1846. Harvey probably had more influence in the hospital than any other physician. He drew up a set of regulations for the hospital which are given in the appendix.[7] These show the relationship between the physicians and surgeons better than any description. Harvey was evidently a strong champion of the rights of the physician and was not inclined to allow the surgeon any liberties. He apparently never lived in the hospital, although asked to do so, and there is a record of money paid to him in place of a house. His duties were to attend at least once a week in the hall of the hospital, where any patients requiring his aid were brought. He had to write his prescriptions and directions in a book. Such were all his duties at first. Probably some years later a regulation was added that in case the patient were too feeble to come to the hall, he should be visited in the ward by the physicians. In 1631 an assistant was appointed, as Harvey, having an appointment at court, would frequently be unable to attend at the hospital. In 1632 complaint was made by the surgeons that Harvey did not attend regularly on account of his court duties. The board then gave him permission to attend the hospital only when he thought fit. There is no record of his retirement as physician, but the last note of any payment made to him is in 1643, at which time he was in Oxford. After his return to London in 1646 he doubtless continued to take an interest in the hospital though not in any official capacity.

The next physician of note is Francis Bernard, who was appointed in 1678. He obtained the position in an unusual way and one worthy of note. The plague visited London in 1665 and St. Bartholomew's did not escape. The physicians deserted their posts and there is a record of a meeting of the governors held out in Essex, at which they censured the physicians for leaving the hospital. Bernard had been made apothecary in 1660 and through the plague he stuck to his post, doing also the duties of the physicians. It was but right that later he should receive the appointment himself. He had a magnificent library and was very learned. Before his death in 1698 he regretted that he had not made notes throughout his works which might have been of value. This is said to have influenced Charles Bernard, a surgeon and one of his contemporaries on the staff, who also had a celebrated library, to make many marginal comments through his books. There are varying statements as to the relationship of the two Bernards.

The next physician was Edward Browne, a son of Sir Thomas Browne, who was appointed in 1682. The first accurate record of the formulæ used in the hospital is found in a note-book of his dated 1670. There seems little doubt but that Browne used Peruvian bark for ague and there is an interesting letter, quoted by Sir William Church,[8] from Sir Thomas Browne to his son regarding its use. Among those who followed are David Pitcairn (1780), who first recognized the association between rheumatism and endocarditis; William Austin (1786), who was the first lecturer on chemistry and showed that the chalk stones of gout were not composed of chalk; and John Latham (1793), who wrote on diabetes. Of the men of more recent days it is not necessary to speak.

The Surgeons.—In 1547 there were three surgeons appointed who were paid 18 pounds a year. Later this was increased and they were given extra payment for special cases. While they had charge of all the patients in the wards, yet their practice was largely controlled by the physicians. Their field of work was also for a time limited by the separate positions of lithotomist and bone-setter. Of the early surgeons the one best known was William Clowes,[9] who was appointed in 1575. He had been attached to both the army and navy and had seen considerable service abroad. He was one of the earliest medical writers who wrote in English, then thought to be far from proper in medical works. In his introduction he says: "But if phisitions be angry that I have written physyke in englyshe let them remember that the grekes wrote in graeke, the Romayns in latyne, Avicenna and the others in Arabike which were their own proper and maternal tongues." His best works are "Prooved Practice for all young Chirougians" and a "Treatise on Struma." He had evidently read widely and quotes many authors. There are many of his quaint sayings and proverbs which are sometimes quoted. He had himself a number of secret salves and ointments—a not uncommon practice of those days. One of his books closed with these lines:

> "All these things should be observed by surgeons as their vowes.
> I wish we all could follow this. Finis. William Clowes."

The next surgeon of note was John Woodhall or Woodall,[9] who was appointed in 1616. He was surgeon to the East India Company and also had control of the surgical affairs of the Navy. His great work was "The Surgeon's Mate, or a Treatise discovering faithfully and plainely the due contents of the Surgion's Chest, the uses of the instruments, the vertues and operations of the medicines, etc." It was first published in 1617. He protested against the custom of his time which denied to the surgeons the right to prescribe for their patients

without the supervision of a physician. Thus he says in The Surgeon's Mate: "Who is hee that can cure a wound, a tumor, an ulcer, yea but an ague with his hand only without fitting medicines? Surely no man; then it must necessarily follow that Surgery, Diet and Medicines (I meane both outward and inward) are inseparable companions and therefore all to be used in the art of curing man's body; and that in the person of one man." These ideas were gradually to gain strength and prevail. There are several conditions to be kept in mind relative to the gradually changing relationships of physicians and surgeons. As Dr. Moore points out, the physicians were as a class much more learned than the surgeons, at any rate more versed in the knowledge of books. Consequently they were more influenced by traditional ideas and had only recently begun to observe and draw conclusions from their own impressions and experience. They had much tradition but little observation. The surgeons, on the contrary, had read little, were not learned in the knowledge of the schools but had observed more. They found it easier to accept new ideas and methods. About this time one of the first learned surgeons was appointed, Charles Bernard (1686). His namesake, the physician, has already been mentioned. Charles Bernard is said to have specially emphasized the recurrence of malignant growths. He was a very learned man, had a magnificent library and is mentioned as a friend of Swift. Edward Nourse (1745) was the first surgeon to give regular instruction in anatomy and surgery. A syllabus of his lectures was published in 1729. Among his pupils was Percival Pott (1714-1788), one of the best known names in surgery. He was appointed surgeon in 1749. In 1756 he was thrown from his horse and sustained a compound fracture of the leg. Amputation was advised by the surgeons who first saw him, but when his former teacher and colleague Nourse arrived, he thought an attempt should be made to save the foot, in which they succeeded. This fracture is said to have been the same to which his name is given. To improve the forced inactivity during his recovery he began to write his first book. He was a voluminous writer and had a great influence on the surgical thought of this time. His work on the spine was published in 1779 and 1782. The next great name is that of John Abernethy (1764-1831), who was elected assistant surgeon in 1787 and surgeon in 1815. He lectured first on anatomy and then on surgery. Of his fame it is not necessary to speak. He attracted students in large numbers and from his time the modern influence of the medical school dates. It must be confessed that at this day there may be difficulty in determining the reasons for his high position in English medicine. He had an unusual personality, he was evidently a wonderful teacher, and it is more to these that we must look for his influence than to his writings. There are many anecdotes related of him which have gone into medical history. He founded a hospital medical society in 1795 and was its first president. After his death the society was named after him and flourishes up to the present. William Lawrence (1824) is a well-known name. The condition of the school and methods of teaching at that time are well shown in the "Memoirs and Letters of Sir James Paget." He was one of the recent surgeons concerning whom it is not necessary to speak.

In conclusion is should not be necessary to urge all who are interested in the history of medicine to pay a visit to this medical shrine of St. Bartholomew. It is not the place to mention the position and influence of the hospital to-day. It is no wonder that wherever we meet a graduate of the school he refers with pride and affection to old "Barts." One can not visit the hospital without being stirred by its history. Dr. Moore says of the entrance: "Its Smithfield gateway, through which passed men of the generation whose fathers saw William the Conqueror enter London, has ever since been open to the sick poor." Looking at the hospital one may reflect on the misery its walls have contained, the sickness, the sorrow, the number who have "wrestled with the pangs of old mortality," and have ended their earthly pilgrimage, but we had rather be with him who looks on the other side of the shield. We should not leave St. Bartholomew's without a reference to the church of St. Bartholomew the Great. The building is difficult to find unless one knows the exact location, for little can be seen from Smithfield, as the church has been completely surrounded. The entrance is through an arch leading into an enclosure which recalls Stevenson's description of the churchyard of Grayfriars in Edinburgh. "Round a great part of the circuit houses of a low class present their walls to the churchyard. Only a few inches separate the living from the dead. A damp smell of the graveyard finds its way into houses when workmen sit at meat. Domestic life on a small scale goes visibly forward at the windows." The church has been elsewhere well described." On the north side is the tomb of the founder with the inscription: "Hic jacet Raherus primus canonicus et primus prior hujus ecclesiæ." The effigy over the tomb is of wood and was probably placed there shortly after the burial. There are the figures of two monks kneeling, each holding a volume of the Scriptures open at the fifty-first chapter of Isaiah. It is a fit resting place for Rahere within the walls of the church built by his endeavor and near the hospital in the founding of which "he builded better than he knew."

APPENDIX.

(1) The principal articles consulted are given here and in the following notes. I desire to express specially my indebtedness to Dr. Norman Moore both for his writings and for much personal kindness and assistance.

References:

Memoranda References and Documents relating to The Royal Hospitals of London. London, 1836.

Delamotte: An Historical Sketch of the Priory and Royal Hospital of St. Bartholomew. London, 1846.

Paget: Records of Harvey. London, 1846. Reprinted in the St. Barth. Hosp. Rep., London, 1886, XXII.

Church: Our Hospital Pharmacopœia. St. Barth. Hosp. Rep., 1884 and 1886, XX and XXII.

Moore: The Physicians and Surgeons of St. Bartholomew's Hospital before the time of Harvey. St. Barth. Hosp. Rep., 1882, XVIII.

The Church of St. Bartholomew the Great. London, 1888.

The Progress of Medicine at St. Bartholomew's Hospital. London, 1889.

The Principles and Practice of Medicine: An Inaugural Lecture. London, 1893.

A Brief Relation of the Past and Present State of St. Bartholomew's Hospital. London, 1895.

The History of the Abernethian Society. London, 1895.

(2) This is given in full in the St. Bartholomew's Hospital Reports, Vol. XXI, 1885, with an introduction by Dr. Moore. The book is worth reading if for nothing more than the English. Of the original Dr. Moore says: "The canon wrote in Latin in a good twelfth century style. He had read but little of the poets, but had St. Jerome's version of the Bible at his finger ends. He uses its phrases on every occasion and seems as much at home in the Minor Prophets as in the Psalms."

(3) This is called the Charter of King Henry the First to St. Bartholomew's Priory, addressed to the Archbishop of Canterbury and to Gilbert the Universal, Bishop of London, in the year 1133. A copy edited from the copy in the Record Office by Dr. Moore was published in 1891. The Bishop of London in 1133 was the successor of Richard de Belmeis, who helped Rahere in the foundation. He was known as Gilbert the Universal on account of his wide knowledge. The charter granted certain rights to the foundation and contains many curious legal terms and phrases.

(4) These orders were reprinted in the St. Bartholomew's Hospital Reports, Vol. XX, 1884. They are also in the Surgeon General's Library in the same volume as Vicary's "The Anatomie of the Bodie of Man," both reprinted by the Early English Text Society. It contains plans of St. Bartholomew's in 1560 and 1604. They probably served as a model for orders which were issued for the four royal hospitals in London in 1557. These are called "The Order of the Hospitalls of K. Henry the VIIIth and K. Edward the VIth, viz.: St. Bartholomew's, Christ's, Bridewell, St. Thomas's." Dr. Osler has a copy of this work. About this period no doubt many of these sets of orders were published. Dr. Hurd has showed me a copy of one published in 1676 at De Clermont Ferrand in France, entitled "Reglement Général pour la Direction et Economie de L'Hopital Général de cette ville." This in its general character is much like the English ones. All of these copies of regulations give many of the duties to be done in much detail. Some are very amusing, perhaps none more so than some to be done by certain of the officials in St. Bartholomew's as directed by orders published in 1813. In these we may see that the porter had no sinecure. In addition to his careful watch at the gates and entrances he was to keep cattle and sheep about the hospital from disturbing the patients (no easy task when one remembers the close proximity of the Smithfield market), take care of the lamps, keep an account of the coal and bread served out, and lastly:

> "You shall superintend and take care of the pumps . . . and you shall assist the Beadles in frequently exercising the fire-engine."

The Beadles referred to were four in number. The *first* Beadle among many other duties received accident cases and measured out the wine for the patients. He was to carry out the dead bodies and notify the friends. In turn with the other Beadles he was to dig the graves and act as clerk at the funerals (at this time there was a burial ground within the hospital walls, which was used until comparatively recent times). He was not to leave the burial ground until the grave was filled up and he was to see the gate of entrance carefully locked. The *second* Beadle's special duties were to measure out beer for the patients and carry coal. The *third* Beadle with other duties was enjoined:

> "You shall take care of the fire engine and keep it always in proper order and frequently call the porter, the other beadles and the box carriers to your assistance in exercising the same, and superintend, wind up and regulate the clock."

The *fourth* Beadle's main distinction was to wait upon the coroner at all inquests.

There are excellent instructions given to the nurses. Distinction is made between the sisters, who have charge of the wards, and the nurses. There are also separate instructions for the day and night nurses. These are exceedingly practical and many of them would be suitable still.

(5) W. S. Church: Our Hospital Pharmacopœia. St. Barth. Hosp. Rep., 1884 and 1885, XX and XXII. These are most interesting papers and well repay reading. One point worthy of note is the account of the ward books of 1679. These were carried around with the physician and contain his prescriptions. Thus in Long Ward on November 17, 1679, we have a list of the patients and a note of the drugs ordered for them. The first on the list is named Shallow. One almost looks involuntarily to see if Slender or Silence is with him. The last on the list is James Valett, for whom six medicines were ordered. His case was evidently desperate, for before the next visit he was dead.

(6) There is special mention of this work in Dr. Moore's address on "The Progress of Medicine at St. Bartholomew's Hospital." The "Breviarium" is divided into fifteen parts and as in books of the time opens with a section on fevers. As noted he was one of the first to use the designation "smal pockes" for variola. He condemns drunkenness in strong terms. Some of his accounts of operations are curious. In one an accumulation of water in the brain was tapped by the cautery. He regrets that a distinction has arisen between the physician and surgeon, for "he cannot be a good physician who neglects every part of surgery."

(7) These are given in the "Records of Harvey," by Sir James Paget, published in 1846 and reprinted in the St.

Bartholomew's Hospital Reports, Vol. XXII, 1886. These were drawn up by Harvey in 1633 and submitted to the governors, by whom they were adopted. They are as follows:

1. That none be taken into the hospitall but such as be curable or but a c'taine number of such as are incurable. Allowed.
2, 3, 4 and 5. These are concerned with the admission of patients and were all allowed.
6. That none lurke here for releife only or for slight causes. Allowed.
7. That if any refuse to take their physick they may be discharged by the do^{r} or apothecary or punished by some order. Allowed.
8. That the chirurgions in all difficult cases, or where inward physick may be necessary, shall consult with the Do^{r}, at the tymes he sitteth once in the weeke and then the M^{r} himselfe relate to the Do^{r} what he conceaveth of the cure and what he hath done therein, And in a decent and orderly manner p'ceed by the do^{rs} direccons for the good of the poore and creditt of the howse. Agreed unto.
9. That no chirurgion or his man doe trepan the head, peirce the body, dismember or doe any greate oper'con on the body of any but wth th'app'bacon and by the direccon of the Do^{r} (when conveniently it may be hadd) and the chirurgions shall thinck it needfull to require. Agreed unto.
10. That no Chirurgion or his man practize by giveinge inward physick to the poor, w'hout th' app'bacon of the Do^{r}. Allowed.
11. That noe Chirurgion be suffered to p'forme the cures in this howse by his Boy or s'rvant w'hout his owne ov'sight or care. Allowed.
12. That ev'ry chirurgion shall shewe and declare unto the Do^{r} whensoev^{r} he shall in the p'sence of the patient require him what he findeth and what he useth to ev'ry externall malady; that soe the Do^{r} being informed may better w^{h} judgm^{t} order his p'scripts.
The Chirurgions p'test against this.
13. That ev'ry Chirurgion shall followe the direccons of the D^{r} in outward oper'cons for inward causes, for recov'ry of ev'ry patient under theire sev'all cures and to this end shall once in the week attend the Do^{r} at the sett howre he sitteth to give direccons for the poore. Agreed by ye Chirurgions.
14. That the Apothecary, Matron and Sisters doe attend the Do^{r} when he sitteth to give direccons and pr'scripts that they may fully conceave his direccons and what is to be done. Allowed.
15. This relates to patients who disobey orders and was allowed.
16. That the Apothecary keepe secrett and doe not disclose what the Do^{r} prescribeth nor the p'scripts he useth but to such as in the Do^{rs} absence may supply his place and that with the Doctors approbacon. Allowed.

Of the sixteen rules seven are specially for the patients and an equal number are to keep the surgeons in order.

(8) Clowes saw service with the Earl of Warwick in 1563 and in the Low Countries in 1585. He seems to have had good results in his treatment of gunshot wounds, but all were not as fortunate, for he says "many bad surgeons slew more than the enemy." Clowes was often concerned in disputes with quacks, in answering whom he did not spare abuse. He gives an account of his putting down a quack. His description of an amputation is very clear. Many interesting quotations from his works are given by Dr. Moore in an article on "The Physicians and Surgeons before Harvey," in the St. Bartholomew's Hospital Reports, Vol. XVIII, 1882.

(9) Woodhall was a distinguished naval surgeon. In addition to "The Surgeon's Mate" he published "A Treatise of Gangrene and Sphacelos," in which he states that during his twenty-four years as surgeon to the hospital he had done or assisted with over 100 amputations of arms or legs, and among these no death had occurred at the time of operation from hæmorrhage. Of these he says that all but four in each twenty recovered. The practice of burning the stumps, which he terms a "horrid cruell course," was not used by him. Woodhall gives these figures to support his view of only cutting off those parts of limbs which were already gangrenous.

(10) There are many descriptions of the church in works on the history and the antiquities of London. Dr. Moore published a description in 1888 and also contributed an illustrated article descriptive of the church in *The Century Magazine*.

STUDIES IN TYPHOID FEVER.

SERIES I-II-III.

The papers on Typhoid Fever, edited by Professor William Osler, M. D., and printed in Volumes IV, V and VIII of The Johns Hopkins Hospital Reports have been brought together, and bound in cloth.

The volume includes thirty-five papers by Doctors Osler, Thayer, Hewetson, Blumer, Flexner, Reed, Parsons, Finney, Cushing, Lyon, Mitchell, Hamburger, Dobbin, Camac, Gwyn, Emerson and Young. It contains 776 pages, large octavo, with illustrations. It gives an analysis and study of the cases of Typhoid Fever in The Johns Hopkins Hospital for the past ten years.

The price is $5.00 per copy. Only a few copies of the volume are on sale. Those wishing to purchase should address their orders to the JOHNS HOPKINS PRESS, BALTIMORE, MARYLAND.

CRYOSCOPY AS AN INDEX OF RENAL INSUFFICIENCY IN SURGICAL DISEASES OF THE KIDNEY.

By Martin B. Tinker, M. D.,
First Assistant Resident Surgeon, Johns Hopkins Hospital, Baltimore.

The systematic study of the freezing points of various solutions was first undertaken by Raoult,[1] who applied to this method of investigation the term cryoscopy, from the Greek, meaning cold or frost, and defined his method as "The study of soluble bodies, based on the observation of the point of congelation of their solutions." It is a well-known fact that solutions of various salts freeze less readily than water. Every one knows that a much lower temperature is required to freeze sea water than fresh water and that a heavy brine is practically unfreezable. But the laws governing the freezing of solutions and their definite statement had not been proposed until Raoult made his studies of the subject. Some years previous to Raoult's studies, De Coppet[2] showed that when a molecule or a proportional quantity by weight of any substance is dissolved in a constant quantity of water the freezing point is always lowered a definite amount. Raoult gave four laws, in substance as follows: (1) All solid, liquid or gaseous substances when dissolved in a liquid lower the freezing point of that liquid. (2) The lowering of the freezing point is proportional to the amount of substance in solution. (3) When a molecule or a proportional quantity of substance is dissolved in a constant quantity of water the freezing point is always lowered a definite degree: this in substance had been stated previously by De Coppet. (4) When various different substances are contained in the same solution the freezing point of the solution is lowered an amount equal to the sums of the freezing points of each substance contained in the solution. While in a general way these facts had long been recognized, their significance had never been pointed out up to the time that they were stated. Since that time physical chemists have recognized in cryoscopy a means of determining definitely the character of a solution by its freezing point and a table of freezing points of various solutions has been made by which it is possible to identify them. Van't Hoff,[3] studying the freezing points still further, showed that equal volumes of isotonic solutions contained the same number of molecules or fragments of molecules and have the same freezing point. Biologists have long known that the rapidity with which solutions pass through an animal membrane depends upon the relative number of molecules contained in the solutions on each side of such a membrane; that is, upon the osmotic pressure and as the freezing point also depends upon the number of molecules contained in solution it offers an accurate means of testing the osmotic pressure of solutions.

The laws governing the freezing point of liquids are not without their exceptions. The freezing point has been shown not to follow exactly the number of molecules in substances contained in solution and this has been explained on the basis of the hypothesis of D'Arrhenius, who supposes that various salts in solution are dissociated more or less into radicals to which the term ions has been applied and the freezing point depends not directly upon the number of molecules contained, but the number of ions into which these molecules are dissociated when in solution. Neither is the freezing point of solutions always proportional to the amount of a substance in solution, for very frequently this is influenced by dilution. In general the greater the dilution the greater the number of molecules dissociated. In complex solutions the freezing point is not always the sum of the freezing points of the contained substances as stated in Raoult's fourth law, for sometimes molecules of various substances contained combine with one another, forming more complex molecules of less number which do not lower the freezing point proportionately.

The credit for the application of cryoscopy to general medicine belongs to Koranyi, professor at Budapest,[4] who with his pupils carried out a large number of physiological and clinical investigations on the osmotic pressure of various animal fluids. He applied the method particularly to diseases of the kidney and since this time the method has been tested by a large number of clinicians and investigators, most of whom testify to its value. Lindemann[5] first pointed out the possibility of its use in the differential diagnosis between suppurative and inflammatory processes affecting the lower genito-urinary tract and those infecting the kidney. Cystitis and pyelitis, for example, while giving rise to changes in the microscopic characteristics of the urine, have no influence on the freezing point. Moritz's[6] investigations are specially valuable from the fact that he was able to study the condition of the kidneys post-mortem in the twelve cases in which he had tested the freezing point and other characteristics of the urine for a considerable length of time during life. Senator,[7] Claude et Balthazar,[8] and Albarran[9] also deserve mention among those who first carefully studied this method of investigation and established its value. Casper and Richter[10] give the results of careful examinations in 90 cases of kidney disease. In

[1] Comptes rendus de l'Académie des sciences, November 27, 1882.
[2] Annales de chim. phys., 1871 and 1872, Tomes xxiii, xxv and xxvi.
[3] Memoires de l'Académie royale des sciences de Suède, Stockholm, 1886.
[4] Ztschr. f. klin. Med., 1897 and 1898, vols. xxxiii and xxxiv.
[5] Arch. f. klin. Med., 1900, vol. lxv, p. 1.
[6] Petersburger med. Wochenschrift, 1900, vol. xxv, N. F. 17, p. 225.
[7] Deutsch. med. Wchnschr., 1900, vol. xxvi, p. 48.
[8] Presse Médicale, 1900, vol. xviii, p. 85.
[9] Annales des maladies genito-urinaires, 1899.
[10] Functionelle Nierendiagnostik mit besonderer Berücksichtigung der Nierenchirurgie, Berlin und Wien, 1901.

most of these, cryoscopic examination was combined with other methods of determining renal insufficiency. They place a higher value on cryoscopic tests of the urine and blood in these cases than the phloridzin test, quantitative estimation of urea or other usual methods, but lay special stress on the agreement of all these methods when tried in a given case. The methylene blue test, which has been so highly commended by some recent investigators, they did not find of special value. Kümmel [11] has had the greatest experience with cryoscopy of any observer and has been one of the most enthusiastic advocates of its use in renal surgery. At the Thirty-First German Surgical Congress he gave the results of 265 freezing point determinations of the blood, including 170 cases in which various operations were performed on the kidneys. In all of his operative cases and in several cases in which post-mortem examinations were performed, the correctness of the estimate made of the condition of the kidneys from cryoscopic examination was determined. Kümmel's series of cases includes almost every pathological condition in which surgical intervention could be considered indicated, including numerous cases of hydronephrosis, pyonephrosis, tuberculosis of the kidney, renal calculus, and tumors; there were also a small number of cases of chronic nephritis in which decortication of the kidney was done. Like Casper and Richter and several other observers, Kümmel has compared the results of cryoscopic examinations with those of other modern tests of renal insufficiency. He does not consider the methylene blue test of sufficient value to be used as a routine, but employs the phloridzin test, quantitative determination of the urea and the other usual tests in all doubtful cases, in conjunction with cryoscopic examination. The latter he considers the most important of all as an index of renal insufficiency.

Kümmel's assistant, Dr. Rumpel, who has done a large amount of the routine work for him, has also tested the freezing point of the blood and urine in a series of cases of typhoid fever and other diseases and finds no important variation from normal point of healthy patients.

Cryoscopy does not seem to have come into very general use in this country or England, for very few papers have appeared in the English language. Ogston [12] briefly reports a small series of cases in which he used the freezing-point determinations with very satisfactory results and suggests its use in diseases of the liver. Sollmann [13] reviews the literature and adds some personal experience with regard to examination of the urine.

The freezing point of both the urine and the blood has been employed as an index to the condition of the kidneys. Under normal conditions the freezing point of the urine varies between —0.9° and —2.0°. A freezing point above —0.9° is generally taken as an indication of renal insufficiency. Physiological variations in the freezing point of normal human blood are far less than those of the urine. Normal blood has a freezing point of —0.56° C. below that of distilled water with a physiological variation of from —0.55° to —0.57°, or only 2-100 degrees. An increase of the freezing point to over—0.58° shows that renal insufficiency is present. While it is more difficult to obtain blood for freezing than urine, the very slight variation in its osmotic pressure makes this test considerably more valuable than that of the freezing point of the urine alone. An advantage of this test over the ordinary chemical tests is that the freezing point is influenced by all the products excreted in the urine and there can be little doubt that many of these waste products are of as great importance in determining the functional activity of the kidney as urea and chlorides for example, which are perhaps most commonly estimated quantitatively. Even under normal conditions the amount of urea excreted daily varies greatly, ranging from 20 to 35 grammes, a variation much greater, no doubt, than that of the total excreta of the urine. The specific gravity of the blood and the urine is of much significance, but the normal variations are also quite great, the blood being influenced by age, sex, condition of nutrition, etc., the specific gravity ranging between 1046 and 1067; while the osmotic pressure of the blood is very constant and corresponds under nearly all conditions to a freezing point of —0.56° C. Not only does this new method seem to offer the advantage of greater accuracy, but is far simpler than the very elaborate methods of quantitative determination or determination of specific gravity which must be used when specially accurate results are desired. The freezing point is determined by means of Beckmann's thermometer or more simply by a modification of Beckmann's original apparatus suggested by Heidenhain. Some believe that the Heidenhain apparatus is not as accurate as the original Beckmann apparatus, but it is in quite general use and experience with the results in a considerable number of cases seem to show that the variation is not more than 1-1000 of a degree, which may be left out of account for ordinary purposes.

To determine more definitely the value of this method the blood of 25 patients in the wards of the Johns Hopkins Hospital who were in normal condition so far as their kidneys were concerned was taken and the results of the freezing point determinations and usual routine tests of the urine were compared. The modified Heidenhain apparatus was used in these tests. It consists of a 45 cm. long thermometer with a large bulb which is graduated from one degree centigrade above freezing to four degrees below the freezing point. The degrees are subdivided into tenths and hundredths and the scale is sufficiently large so that 1-200 of a degree can be easily read. To allow for expansion of the mercury in warm weather and at ordinary room temperature a reservoir bulb is provided at the upper end of the tube. For ordinary examinations about 20 cc. of blood or urine are taken, although the test can be made with a fair degree of accuracy with half that amount. The blood or urine to be examined is placed in a test tube, which in turn is inserted in a larger tube which makes an air space about the fluid to be frozen, insuring gradual cooling of the liquid to be examined. To lower the tem-

[11] Centralblatt für Chirurgie, 1902, xxix, p. 121 of Beilage.
[12] Lancet, 1901, ii, 1253.
[13] American Medicine, 1902, N, 656.

perature to the freezing point a mixture of salt and ice may be used, but an apparatus is also on the market in which the lowering of temperature is brought about by evaporation of ether. The test tube containing the blood or urine to be examined may be placed directly in the salt and ice mixture until the mercury comes down out of the reservoir bulb. This will save a great deal of time in the freezing and if the blood or urine be warm it may be difficult to freeze it without this is done. The test tube containing the solution is then placed within the second tube which acts as an air chamber. While the solution is cooling it is stirred constantly by means of a wire loop so that the solution is thoroughly mixed and kept everywhere at the same temperature. The mercury sinks more or less rapidly, not to the point of freezing, but considerably below it before freezing really takes place. As freezing occurs heat is given off and the mercury again rises to the freezing point, where it remains for some time. If left in the freezing mixture, however, the mercury again begins to fall and can be reduced if desired to the temperature of the ice and salt mixture. Before the thermometer is used it should be tested by trying the freezing point of distilled water. Usually there will be a slight variation from the zero point which must be taken into account in estimating the freezing point of the blood or urine to be tested. When the solutions and mixture are prepared, not more than ten or fifteen minutes are required for freezing and the time may be reduced one-half if a second test is to be made after everything is prepared. The necessary amount of blood for a test can be readily obtained by the use of a large aspirating syringe in the same way as blood is usually taken for blood cultures. The arm should first be cleaned up under strict aseptic precautions and the syringe and needle boiled. A band is tied about the arm, which makes the large veins prominent, and a needle can usually be readily inserted into one of the veins near the bend of the elbow. In certain cases there is so much subcutaneous fat that it is difficult to find a vein and in others the veins may be extremely small. For these reasons it was found necessary to expose the vein by dissection under cocaine anæsthesia or to do a venesection in about one-third of the cases. Patients usually appreciate a careful study of their cases and seldom object to this. It is not necessary to defibrinate the blood, as it has been shown that the freezing point of the entire blood is the same as that of the blood serum and the osmotic pressure is dependent only upon the number of molecules of dissolved substances, not upon suspended particles.

In preparing the freezing mixture the ice should be rather coarsely broken; otherwise it is not readily stirred and melts too rapidly to be used for testing a number of specimens. The ice is put into the jar in layers, the first layer is particularly coarse, and a generous quantity of coarse salt is sprinkled in with each layer. The tube which acts as an air chamber should be held in position while the ice is packed in place, otherwise it will be very difficult to get it in place in the jar. When the jar is packed full the freezing mixture is stirred by means of a heavy wire ring and rod, which mixes the salt and ice thoroughly. The mixture thaws rapidly and if several specimens are to be frozen the water may be poured off and fresh ice and salt added from time to time. When the jar is once filled, relatively much less time is required to freeze a number of specimens.

The series of cases tested in this hospital, using the blood of patients in normal condition so far as their kidneys were concerned, gave surprisingly uniform results. The blood in 23 out of 25 cases froze at exactly 0.56° C. The samples of blood examined were taken from patients of nearly every possible combination of age, sex, color, occupation and condition of health. In the two remaining cases there was a variation of but 1-100 degree centigrade, which is within what has been found to be normal limits. There was nothing to account for this slight variation. The patients suffered no ill effects from the taking of blood, even when venesection or dissection of a vein was found necessary. In most of the cases the arm of the patient and the freezing mixture were prepared by the nurse, but when one does unaided everything necessary for cryoscopic examination of the blood, the amount of time consumed need not exceed three-quarters of an hour. Where several specimens of blood are examind a great deal of time is saved. The test is then one which is not more time-consuming or difficult than very many of the modern methods of clinical examination which are in general use. Three cases of pus kidney which came to necropsy later were examined and in each the variation of the freezing point from the normal was quite striking. The results obtained in the series of cryoscopic examinations of the blood and urine agree with those of others who have carried out such investigations and do not seem to have sufficient interest to make them worthy of detailed report, but post-mortem examination has been possible in so few cases in which cryoscopic examinations have been made that a brief report of these three cases may be of interest.

Case I.—A well-developed but poorly nourished white man of 58 entered the hospital with his bladder distended with urine to the level of the umbilicus and with œdema of the feet and ankles. For three months he had been troubled with dribbling of urine and for a month with abdominal pain. Nearly a gallon of urine was withdrawn with a catheter, and a permanent catheter was left in the bladder. The patient passed reasonably large amounts of urine, but the percentage of urea was low in spite of free use of diuretics. Total amounts of urine voided for 4 days before death: 1540 cc., 3180 cc., 3820 cc., 2840 cc. The patient's general condition became gradually worse and he sank into an unconscious state 48 hours before death, his symptoms being those typical of uræmia.

Urine cloudy, pale yellow, S. G. 1010, alkaline, no sugar, trace of albumin, sediment cloudy and containing pus cells, triple phosphates, a few red blood cells, shreds of mucus. Practically the same condition found on five analyses.

Freezing point of blood.....	—0.71°
Freezing point of urine.....	—0.53°

Urea .....4.5 mg. to cc.
Specific gravity 1.012

Anatomical diagnosis: Hypertrophied prostate, pyonephrosis and multiple abscesses of both kidneys.

CASE II.—A colored man of 59 was brought into the hospital in a semi-comatose condition. No history could be obtained as to his illness. On examination the bladder was found distended; attempts to catheterize failed, but the bladder was immediately aspirated and 2500 cc. of urine withdrawn. A later attempt at catheterization proved successful, a drainage catheter was left in the bladder, through which the bladder was irrigated daily, fluids were given freely by mouth, rectum, and infusion, and for a week the patient's condition improved. Then without any apparent reason his condition became worse and he rapidly sank and died the ninth day after admission.

For five days the amounts of urine varied from 900 to 2180 cc.

Urine bloody, S. G. 1014, acid, no sugar, albumin in large amount. Sediment reddish white, containing blood and pus, a few hyaline and granular casts, no crystals.

Freezing point of blood..... —0.69°
Freezing point of urine..... —0.47°
Urea .....14 to 16 grams
Specific gravity 1.009

Anatomical diagnosis: Œdema of lungs. Multiple abscesses of kidneys. Hypertrophied prostate. Cystitis.

CASE III.—A white man of 74 was admitted to the hospital with a history of frequent micturition for 6 months. He was able to void urine, but 450 cc. of turbid residual urine was withdrawn on catheterization. His general condition was very bad and urination and catheterization very painful. He became somnolent and at times delirious on the twelfth day after admission and gradually sank and died on his thirteenth day in the hospital.

Daily amounts of urine varied from 1440 to 1960 cc.

Urine turbid, pale yellow, S. G. 1014, acid, no sugar, albumin present in large amount, sediment contained white and red blood cells, epithelial cells, triple phosphates and large amounts of mucus; no casts seen.

Freezing point of blood..... —0.63°
Freezing point of urine..... —0.87°
Urea .....4.5 mg. to cc.
Specific gravity 1.010

Anatomical diagnosis: Pyonephrosis.

The results of cryoscopic examination of the blood in this comparatively small series seemed to show that it is an extremely reliable and satisfactory test. The results agree entirely with those of Kümmel, Koranyi and his pupils and others who have examined larger numbers of cases. The freezing point of normal human blood is practically constant at 0.56° C. with an occasional slight variation of 1-100 degree in healthy persons; while in diseases of the kidney extensive enough to endanger the life of a patient it has invariably shown a considerable variation from these normal limits, as was true of the cases here reported and has been found in the experience of others who have had the opportunity to observe larger series of cases.

The variation of the freezing point of the urine is much greater and has a correspondingly smaller value. In the cases tested, the mixed specimens of urine varied within the limits which have been determined to be normal, that is, between —0.9 and —2.0. If separate urines can be obtained by catheterization of the ureters the results of cryoscopic examination are much more valuable in diseases of the kidney. Through the kindness of Dr. Guy L. Hunner, Resident Gynæcologist at the Johns Hopkins Hospital, I was able to examine specimens obtained by catheterization of the ureter in seven cases in which disease of the kidney was suspected. In three of these cases the exact condition of the kidney was subsequently determined by operation. In none of the cases was there renal insufficiency, the sound kidney being in good enough condition to do the necessary work for the body, but in two cases of tuberculosis of the kidney the difference in the freezing point of the urine taken from the diseased kidney and that of the mixed specimen or a specimen taken from the normal kidney was quite striking and indicated even more definitely than the results of quantitative examination of the urea, tests of specific gravity and the other usual tests of the urine, the location of the disease. These cases in which disease was found may be of sufficient interest to deserve brief report.

A woman of 57 had been suffering from bladder trouble for several years. After the usual diagnostic methods had been employed, tuberculosis of the bladder, ureter and left kidney were diagnosed. Three operations were performed, vesico-vaginal fistula with continuous irrigation for the improvement of the condition of the bladder, later nephrectomy and partial removal of the ureter and a third operation for closure of the vesico-vaginal fistula. The patient made good recoveries from her operations.

Pathological examination showed tuberculosis of the kidney, pelvis of the kidney and ureter. Urine was pale, slightly turbid, specific gravity 1012, faintly acid, no sugar; trace of albumin, whitish sediment containing much pus, a few epithelial cells but no casts.

Freezing point of the blood..... —0.56°
Freezing point of the urine, mixed specimen.. —1.89°
Freezing point of the urine, left kidney.... —0.49°

A white woman of 39 was operated upon, nephrotomy being performed for abscess of the left kidney. Two small calculi were found. Two years after first operation nephrectomy was done for persistent sinus, a very much atrophied kidney being removed. There was also cystitis for which vesico-vaginal fistula was done with secondary operation for closure. Satisfactory recovery followed. A large number

of examinations of the urine were made. The results are fairly well shown by the following:

Urine: Light amber, cloudy, specific gravity 1008, alkaline, no sugar, trace of albumin; slight white granular precipitate. Microscopical examination showed epithelial and pus cells, triple phosphates and numerous bacteria.

Freezing point of the blood..... —0.56°
Freezing point of the urine..... —1.23°

A white woman of 29 was admitted to the hospital with symptoms referred to the right kidney. A diagnosis of tuberculosis of the kidney, ureter and tuberculous ulceration of the bladder was made after cystoscopy and catheterization of the ureters. Right nephro-ureterectomy with excision of the ulcer from the bladder was performed. The kidney was found badly diseased with a number of tuberculous cavities; there was also tuberculosis of the pelvis of the kidney and ureter. Tuberculosis of the lungs was suspected. The patient made a good recovery from the operation. Specimens from catheterization of the ureter were obtained on several occasions. The mixed specimen of urine was dark amber in color, specific gravity 1010, acid, no sugar, slight trace of albumin, whitish sediment containing numerous white blood corpuscles. The urine obtained from the left kidney contained no blood cells. Repeated examinations of the sediment from the right kidney failed to show tubercle bacilli, but the patient reacted to tuberculin.

Freezing point of the blood..... —0.56°
Freezing point of the urine, right kidney. —0.625°
Freezing point of the urine left kidney.. —1.74°

While the freezing point of the blood indicated that the sound kidneys were in condition to do the necessary work for the body, the difference in the freezing points of the urine from catheterization of the ureters, clearly showed the location and extent of the disease in the tuberculosis cases, and more strikingly than the usual tests.

Unfortunately I did not obtain specimens of urine from catheterization of the ureters in the case of calculous pyonephrosis, so only the negative information that renal insufficiency was not present could be determined.

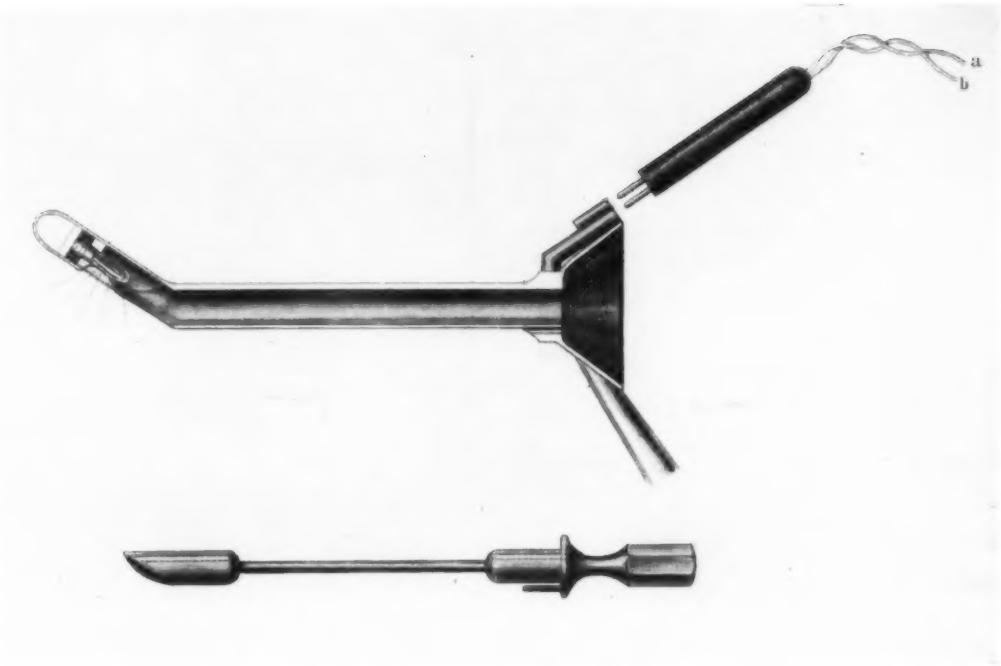
A sufficiently large number of cryoscopic examinations have been made by reliable observers to prove positively the value of the test. The advantages over the usual quantitative chemical tests have already been mentioned, the chief advantage being that it gives an index of the total waste products excreted by the urine instead of that of a single constituent. While it is desirable that information be obtained from as many sources as possible as to the condition of the kidney before extensive operations, the cryoscopic test has proved so reliable in the hands of numerous observers and is so much simpler than many of the methods which have been employed that it would seem that it alone might be relied upon to determine the condition of the kidney provided it is possible to obtain specimens by catheterizing both ureters. The value of cryoscopic examination of mixed specimens alone is far less and does not compare in accuracy with the value of the cryoscopic examination of the blood. In all doubtful cases both tests may be used in combination with the usual chemical tests with added certainty as to the state of the kidneys. The chief value of the test is in determining the prognosis in doubtful cases. If the examination indicates a condition of renal insufficiency of high degree, operation may be contraindicated. In other cases it may be of aid in determining whether nephrectomy or a less extensive operation, for example, nephrotomy or nephrolithotomy, should be given preference. The field of usefulness of this test in surgical cases is a limited one, but in cases in which such a test is needed it is often very much needed and the information obtained is correspondingly valuable. In favor of cryoscopic examination it may be said that it is simple and may be readily made by those little experienced in its use; that it does not require special training as is required for accurate use of many other methods of examination; that it is not more time-consuming than very many other methods of clinical examination in general use; that the results of this method of examination have been determined by a large number of observers to be more reliable and accurate than those of the tests now in general use; that while this method of examination has a limited field of usefulness, it is of decided value in cases in which its use is indicated.

A SIMPLE ELECTRIC FEMALE CYSTOSCOPE.

By Thomas S. Cullen, M. B. *Associate in Gynecology, the Johns Hopkins Hospital.*

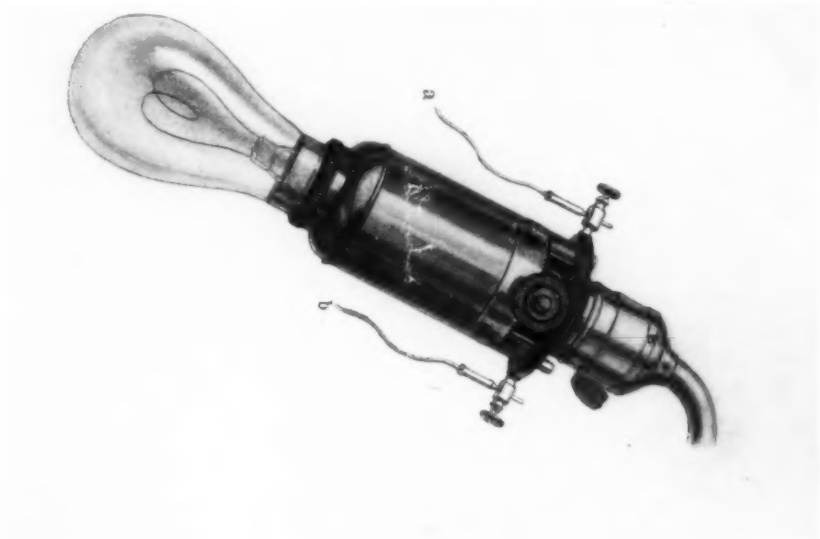
For the usual exploration of the bladder any cystoscope will answer, but where careful scrutiny of the ureters is required, considerable difficulty is often experienced by those who are not called upon to do vesical work every day.

Electrical cystoscopes if properly constructed render the examination of all parts of the bladder comparatively easy. There are, however, several serious objections to their usage. In the first place the electric lamps are so small that if the utmost care be not exercised they are burned out, occasioning not only much delay, but also considerable expense. Again, the small connecting wires on several of the cystoscopes have only lasted for a few weeks, and with their destruction the usefulness of the cystoscope was entirely gone. Probably the chief drawback to the use of the electrical cystoscope has been the unreliability of the storage battery which would so frequently give out just when it was most needed.



LONGITUDINAL SECTION OF THE CYSTOSCOPE.

FIG. 1.—With the obturator in place the sharp angle near the tip of the instrument is completely removed. The lamp is large and is easily withdrawn from the tip of the instrument. There are no wires to get out of order. The electrical attachment is indicated and may be made by an interlocking device if so desired. The wires *a* and *b*, if so desired, can be covered by rubber tubing, allowing of their sterilization. At Fig. 2 in *a* and *b* the other ends of the electric wires which are usually six to eight feet long are shown.



THE NEW TRANSFORMER IN POSITION.[2]

FIG. 2.—It is inserted between the plug and the ordinary electric lamp bulb. The current is turned on as usual. With the small wheel at "off" the cystoscope receives no light. When at "on" there is abundant light for the strongest cystoscope. With the wheel in its present position there is sufficient light for the cystoscope.

[2] This transformer was recently designed by a Rochester electrician and will in the large cities practically do away with the use of storage batteries for lighting electrical instruments.

With the idea of overcoming all these obstacles the accompanying instrument was planned. In shape it resembles a short male cystoscope. Its connections are all covered, at no point being exposed. The electric lamp is relatively large in size, thus giving good illumination and diminishing the possibility of burning out. The instrument is readily controlled with a long handle. The lumen of the tube is perfectly straight. The controller represented in Fig. 2 has recently been made by one of the Rochester firms and is an admirable addition to our cystoscopic armamentarium. It does away entirely with the necessity of the battery and can be used wherever the electric current has been installed. This instrument is so small that it can be readily carried in one's pocket. It is to be inserted between the socket and the globe of any electrical fixture. To it the cystoscopic wires are then attached and we can by the small wheel regulate absolutely the amount of current desired. I have been using the same cystoscopic lamps for several months without the slightest difficulty. If, by any chance, the lamp should give out, the cystoscope need not be withdrawn but can be utilized as a Kelly cystoscope, the head mirror and reflected light being used.

Our instrument is handled as follows: Both obturator and cystoscope are placed in pure carbolic acid for ten minutes, then rinsed in alcohol, then in sterile water.[1]

A small transformer is now inserted between the ordinary electric globe and its socket. The cystoscopic wires are attached to the transformer, care being taken to note that the small wheel indicates current "off." The cystoscope is now connected up and the wheel gradually turned until the necessary light is obtained. It is unnecessary to darken the room. After cleansing the urethral area with bichloride the ureter and bladder are rendered insensible by weak solutions of cocaine.

[1] This method of preparation has been employed by Young and others with perfect satisfaction. After use the instrument is thoroughly scrubbed with soap and water, a fine brush being used.

HOSPITAL STAFF JUNE 1, 1903.

SUPERINTENDENT:
HENRY M. HURD, M. D.

PHYSICIAN-IN-CHIEF:
WILLIAM OSLER, M. D.

SURGEON-IN-CHIEF:
WILLIAM S. HALSTED, M. D.

GYNECOLOGIST-IN-CHIEF:
HOWARD A. KELLY, M. D.

OBSTETRICIAN-IN-CHIEF:
J. WHITRIDGE WILLIAMS, M. D.

PATHOLOGIST:
WILLIAM H. WELCH, M. D.

ASSOCIATES IN SURGERY:
J. M. T. FINNEY, M. D., J. C. BLOODGOOD, M. D.,
HARVEY CUSHING, M. D.

ASSISTANT IN ORTHOPEDIC SURGERY:
WILLIAM S. BAER, M. D.

ASSISTANT IN ACTINOGRAPHY.
F. H. BAETJER, M. D.

ASSOCIATES IN MEDICINE:
W. S. THAYER, M. D., T. B. FUTCHER, M. B.

ASSOCIATES IN GYNECOLOGY:
W. W. RUSSELL, M. D., T. S. CULLEN, M. B.

RESIDENT PHYSICIAN:
T. McCRAE, M. B.

ASSISTANT RESIDENT PHYSICIANS:
R. I. COLE, M. D., *C. P. EMERSON, M. D.,
C. P. HOWARD, M. B.

*Absent on leave.

RESIDENT SURGEON:
R. H. FOLLIS, M. D.

ASSISTANT RESIDENT SURGEONS:
S. H. WATTS, M. D., W. F. M. SOWERS, M. D.,
†E. H. HUME.

RESIDENT GYNECOLOGIST:
J. A. SAMPSON, M. D.

ASSISTANT RESIDENT GYNECOLOGIST:
C. F. BURNAM, M. D.

RESIDENT OBSTETRICIAN:
F. W. LYNCH, M. D.

ASSISTANT RESIDENT OBSTETRICIANS:
H. M. LITTLE, M. D., JOSIAH M. SLEMONS, M. D.

RESIDENT PATHOLOGIST:
W. G. MacCALLUM, M. D.

ASSISTANT RESIDENT PATHOLOGIST,
H. T. MARSHALL, M. D.

HOUSE MEDICAL OFFICERS:

J. AUER, M. D.,
J. B. BRIGGS, M. D.,
C. BUSH, M. D.,
J. W. CHURCHMAN, M. D.,
T. W. CLARKE, M. D.,
H. W. COOK, M. D.,
M. L. HAVILAND, M. D.,
C. H. HORST, M. D.,
E. W. MEISENHELDER, M. D.,
C. P. ROGERS, M. D.,
O. B. WIGHT, M. D.,
C. B. WRIGHT, M. D.

EXTERNES:
J. I. BUTLER, M. D., S. RUSHMORE, M. D.

†Acting.

THE JOHNS HOPKINS HOSPITAL REPORTS.

VOLUME I. 423 pages, 99 plates.

VOLUME II. 570 pages, with 28 plates and figures.

VOLUME III. 766 pages, with 69 plates and figures.

VOLUME IV. 504 pages, 33 charts and illustrations.

Report on Typhoid Fever.

By WILLIAM OSLER, M. D., with additional papers by W. S. THAYER, M. D., and J. HEWETSON, M. D.

Report in Neurology.

Dementia Paralytica in the Negro Race; Studies in the Histology of the Liver; The Intrinsic Pulmonary Nerves in Mammalia; The Intrinsic Nerve Supply of the Cardiac Ventricles in Certain Vertebrates; The Intrinsic Nerves of the Submaxillary Gland of *Mus musculus*; The Intrinsic Nerves of the Thyroid Gland of the Dog; The Nerve Elements of the Pituitary Gland. By HENRY J. BERKLEY, M. D.

Report in Surgery.

The Results of Operations for the Cure of Cancer of the Breast, from June, 1889, to January, 1894. By W. S. HALSTED, M. D.

Report in Gynecology.

Hydrosalpinx, with a report of twenty-seven cases; Post-Operative Septic Peritonitis; Tuberculosis of the Endometrium. By T. S. CULLEN, M. B.

Report in Pathology.

Deciduoma Malignum. By J. WHITRIDGE WILLIAMS, M. D.

VOLUME V. 480 pages, with 32 charts and illustrations.

CONTENTS:

The Malarial Fevers of Baltimore. By W. S. THAYER, M. D., and J. HEWETSON, M. D.

A Study of some Fatal Cases of Malaria. By LEWELLYS F. BARKER, M. B.

Studies in Typhoid Fever.

By WILLIAM OSLER, M. D., with additional papers by G. BLUMER, M. D., SIMON FLEXNER, M. D., WALTER REED, M. D., and H. C. PARSONS, M. D.

VOLUME VI. 414 pages, with 79 plates and figures.

Report in Neurology.

Studies on the Lesions produced by the Action of Certain Poisons on the Cortical Nerve Cell (Studies Nos. I to V). By HENRY J. BERKLEY, M. D.

Introductory.—Recent Literature on the Pathology of Diseases of the Brain by the Chromate of Silver Methods; Part I.—Alcohol Poisoning.—Experimental Lesions produced by Chronic Alcoholic Poisoning (Ethyl Alcohol). 2. Experimental Lesions produced by Acute Alcoholic Poisoning (Ethyl Alcohol); Part II.—Serum Poisoning.—Experimental Lesions induced by the Action of the Dog's Serum on the Cortical Nerve Cell; Part III.—Ricin Poisoning.—Experimental Lesions induced by Acute Ricin Poisoning. 2. Experimental Lesions induced by Chronic Ricin Poisoning; Part IV.—Hydrophobic Toxaemia.—Lesions of the Cortical Nerve Cell produced by the Toxine of Experimental Rabies; Part V.—Pathological Alterations in the Nuclei and Nucleoli of Nerve Cells from the Effects of Alcohol and Ricin Intoxication; Nerve Fibre Terminal Apparatus: Asthenic Bulbar Paralysis. By HENRY J. BERKLEY, M. D.

Report in Pathology.

Fatal Puerperal Sepsis due to the Introduction of an Elm Tent. By THOMAS S. CULLEN, M. B.

Pregnancy in a Rudimentary Uterine Horn. Rupture, Death, Probable Migration of Ovum and Spermatozoa. By THOMAS S. CULLEN, M. B., and G. L. WILKINS, M. D.

Adeno-Myoma Uteri Diffusum Benignum. By THOMAS S. CULLEN, M. B.

A Bacteriological and Anatomical Study of the Summer Diarrhoeas of Infants. By WILLIAM D. BOOKER, M. D.

The Pathology of Toxalbumin Intoxications. By SIMON FLEXNER, M. D.

VOLUME VII. 537 pages with illustrations.

I. A Critical Review of Seventeen Hundred Cases of Abdominal Section from the standpoint of Intra-peritoneal Drainage. By J. G. CLARK, M. D.

II. The Etiology and Structure of true Vaginal Cysts. By JAMES EWING STOKES, M. D.

III. A Review of the Pathology of Superficial Burns, with a Contribution to our Knowledge of the Pathological Changes in the Organs in cases of rapidly fatal burns. By CHARLES RUSSELL BARDEEN, M. D.

IV. The Origin, Growth and Fate of the Corpus Luteum. By J. G. CLARK, M. D.

V. The Results of Operations for the Cure of Inguinal Hernia. By JOSEPH C. BLOODGOOD, M. D.

VOLUME VIII. 552 pages with illustrations.

On the role of Insects, Arachnids, and Myriapods as carriers in the spread of Bacterial and Parasitic Diseases of Man and Animals. By GEORGE H. F. NUTTALL, M. D., PH. D.

Studies in Typhoid Fever.

By WILLIAM OSLER, M. D., with additional papers by J. M. T. FINNEY, M. D., S. FLEXNER, M. D., I. P. LYON, M. D., L. P. HAMBURGER, M. D., H. W. CUSHING, M. D., J. F. MITCHELL, M. D., C. N. B. CAMAC, M. D., N. B. GWYN, M. D., CHARLES P. EMERSON, M. D., H. H. YOUNG, M. D., and W. S. THAYER, M. D.

VOLUME IX. 1060 pages, 66 plates and 210 other Illustrations.

Contributions to the Science of Medicine.

Dedicated by his Pupils to WILLIAM HENRY WELCH, on the twenty-fifth anniversary of his Doctorate. This volume contains 38 separate papers.

VOLUME X. 516 pages, 12 plates and 25 charts.

Structure of the Malarial Parasites. Plate I. By JESSE W. LAZEAR, M. D.

The Bacteriology of Cystitis, Pyelitis and Pyelonephritis in Women, with a Consideration of the Accessory Etiological Factors in these Conditions, and of the Various Chemical and Microscopical Questions Involved. By THOMAS R. BROWN, M. D.

Cases of Infection with Strongyloides Intestinalis. (First Reported Occurrence in North America.) Plates II and III. By RICHARD P. STRONG, M. D.

On the Pathological Changes in Hodgkin's Disease with Especial Reference to its Relation to Tuberculosis. Plates IV-VII. By DOROTHY M. REED, M. D.

Diabetes Insipidus with a Report of Five Cases. By THOMAS B. FUTCHER, M. B. (Tor.)

Observations on the Origin and Occurrence of Cells with Eosinophile Granulations in Normal and Pathological Tissues. Plate VIII. By W. T. HOWARD, M. D., and R. G. PERKINS, M. D.

Placental Transmission with Report of a Case during Typhoid Fever. By FRANK W. LYNCH, M. D.

Metabolism in Albuminuria. By CHAS. P. EMERSON, A. B., M. D

Regenerative Changes in the Liver after Acute Yellow Atrophy. Plates IX-XII. By W. G. MACCALLUM, M. D.

Surgical Features of Typhoid Fever. By THOS. MCCRAE, M. B., M. R. C. P. (Lond.), and JAMES F. MITCHELL, M. D.

The Symptoms, Diagnosis and Surgical Treatment of Ureteral Calculus. By BENJAMIN R. SCHENCK, M. D.

The set of ten volumes will be sold for fifty-five dollars, net. Volumes I and II will not be sold separately. Volumes III, IV, V, VI, VII, VIII and X will be sold for five dollars, net, each. Volume IX will be sold for ten dollars, net.

SEPARATE MONOGRAPHS REPRINTED FROM THE JOHNS HOPKINS HOSPITAL REPORTS.

Studies in Dermatology. By T. C. GILCHRIST, M. D., and EMMET RIXFORD, M. D. 1 volume of 164 pages and 41 full-page plates. Price, bound in paper, $3.00.

The Malarial Fevers of Baltimore. By W. S. THAYER, M. D., and J. HEWETSON, M. D. And **A Study of some Fatal Cases of Malaria.** By LEWELLYS F. BARKER, M. B. 1 volume of 280 pages. Price, bound in paper, $2.75.

Pathology of Toxalbumin Intoxications. By SIMON FLEXNER, M. D. 1 volume of 150 pages with 4 full-page lithographs. Price, in paper, $2.00.

Studies in Typhoid Fever. I, II, III. By WILLIAM OSLER, M. D., and others. Extracted from Vols. IV, V and VIII of the Johns Hopkins Hospital Reports. 1 volume of 881 pages. Price, bound in cloth, $5.00.

Orders should be addressed to

The Johns Hopkins Press, Baltimore, Md.

The Johns Hopkins Hospital Bulletins are issued monthly. They are printed by THE FRIEDENWALD CO., Baltimore. Single copies may be procured from Messrs. CUSHING & CO. and the BALTIMORE NEWS CO., Baltimore. Subscriptions, $1.00 a year, may be addressed to the publishers, THE JOHNS HOPKINS PRESS, BALTIMORE, single copies will be sent by mail for fifteen cents each.